entered as 0, and a sky completely covered with cloud as 10. The number of days at the various stations at which "a measurable quantity of rain fell," are given in Table xxx. The exact amount of rain constituting a rainy day should in future be stated. In Great Britain only those days on which at least 0·01 inch falls are regarded as "rainy days." We are glad to see that Symons' gauges (5-in. diam.) are adopted—this being the gauge best suited for general introduction—and that the height is a foot above the ground.

We have long been convinced that for a first satisfactory scientific discussion of some of the more difficult problems of the science we must look for the data of observation to India, with its splendid variety of climates, exposures, and abrupt mountain ranges and isolated peaks. The chief of these questions are, the variations in the daily march of temperature as dependent on season, latitude, height, and situation, both maritime and inland; the hourly barometric fluctuations (of which so little is really known), particularly as influenced by strong insolation, vapour, cloud, aqueous precipitation, and height either on extended plateaus or on hills rising abruptly from the plains; and the vital question of atmospheric humidity, to put which on a proper footing as regards hot dry climates, laboratory experiments being all but worthless, recourse must be had to extensive observations and experiments conducted under such conditions as are presented by the scorching climate of the Punjâb. In the further development of Indian and general meteorology, the establishment of a Physical Observatory in the Punjâb is urgently called for, as being, in truth, indispensable for the prosecution of these and other physical researches.

OUR BOOK SHELF

A Year's Botany, adapted to Home and School Use. By Frances Anna Kitchener. Illustrated by the Author. (Rivingtons: London, Oxford, and Cambridge, 1874.)

THIS unpretending little book is one that is sure to find its way wherever Natural Science is taught in the only way in which it is worth teaching, as a training for both the observing powers and the reasoning faculties. The greater part appeared originally in the *Monthly Packet*, and has been reprinted with additions at the request of friends more discriminating than is usually the case under such circumstances. We know of no book which we could more safely and confidently place in the hands of young people as their first guide to a knowledge of botany. The illustrations are from drawings from nature by the authoress, and are a pleasing change from those which have already done duty in so many text-books.

The following sentence, from the first chapter, illustrates the mode in which the writer conveys her instruction:—"But first I must beg that my readers will give me a fair trial; that they will pick the flowers described, and examine them *while* they read the description; and that they will trace every law, arrangement, and peculiarity in their living illustrations. Sometimes these may not be seen at the first glance, or even in the first specimen, but they must pick fresh flowers, look and look again, and *take nothing upon trust*, remembering that one of the chief lessons botany has to teach is how to use both eye and hand." Several typical flowers are then taken—the buttercup, wall-flower, cucumber or vegetable marrow, gorse, garden-pea, and primrose, and the various parts of each described in ordinary language, without the use of any technical terms. To these succeed separate chapters "On Flowers with Simple Pistils," "On Flowers with Compound Pistils," "On Flowers with Apocarpous Fruits," "On Flowers with Syncarpous Fruits," and "On Stamens and the Morphology of Branches." To each chapter is prefixed a list of specimens which will be required to enable the student to follow for himself the writer's analysis; the descriptions are given in an extremely easy and lucid style, a few of the commonest scientific terms—but as few as possible—being gradually substituted for the colloquial English phrases at first employed. A sufficient acquaintance having then been obtained with the morphology of the more conspicuous organs, and their functions at the same time explained, the phenomena of nutrition, respiration, and fertilisation, and the structure of tissues, are described in chapters "On Fertilisation," "On Seeds," "On Early Growth and Food of Plants," "On Wood, Stems, and Roots," and "On Leaves." A chapter is then given to classification, to which is appended some useful tables of the characters of the more important orders; and this is followed by two or three chapters devoted to a few of the more important natural orders, and intended to serve as an introduction to the mode of naming plants. The most commonly used technical terms which have not been employed in the work itself are explained in an appendix, in which the wants of students preparing for the University Local Examinations have been kept in view.

The mistaken plan on which many botanical text-books have been compiled is so largely answerable for the horror in which the subject is held by candidates for examination who endeavour to cram facts and technical terms in an incredibly short space of time, without an attempt at practical work, and in the end fail miserably, that we cordially welcome an attempt to place the study on its true footing. We entirely concur in the view of the writer, that to this false method is due the fact that "Botany is so often stigmatised as a dry, uninteresting study;" an opinion which would speedily disappear were her mode of instruction in general use in the family and the school. Mrs. Kitchener's "A Year's Botany" seems to us admirably adapted for the purpose which she had in view in publishing it, and we heartily desire for it a large circulation. A. W. B.

Dental Pathology and Surgery. By S. J. A. Salter, F.R.S. (London: Longmans, Green, and Co., 1874.)

THERE is much in dental surgery besides the simple extraction of teeth, and it is to the consideration of the science of dental pathology that Mr. Salter devotes most of the work under notice. The introductory chapters treat shortly of structure and function, development being left out of consideration. An excellent diagram explains the relation of the tongue to the different parts of the mouth during the pronunciation of the various letters of the alphabet, which latter is arranged on a physiological basis, dependent on the situation of the point of closure by which the sound is produced, upon the completeness or incompleteness of the closure, and upon whether the breathing is soft or aspirate. To the purely physiological student the chapter on irregularities in the position and union of contiguous teeth will be of particular interest; as will the instances given of defects in their number depending on hereditary causes, and on alopœcia; to which we may add the peculiar deficiency always connected with the excessive development of hair over the face, as in the Russian man and child who so recently visited this country. The differentiation off from pure surgery of a class of tumours which, before Mr. Salter's investigations, were considered to belong to the bones themselves, and which, as odontomes, are now known to be composed of secondary dentine, will be specially instructive to the pathologist, as will the question of reflex nervous phenomena, such as partial paralysis and blindness, from the irritation of a diseased tooth. A full and very instructive account is also given of "phosphorus

disease," which attacks in so painful a manner the manufacturers of lucifer matches, and which can be so completely obviated by the employment in their construction of red instead of ordinary phosphorus, because the former does not give rise to the formation of acid fumes when exposed to the air, and therefore does not attack the mouth and teeth. There is one subject on which we have looked, but in vain, through this volume for information: it is for the explanation of how it is that tooth-disease and civilisation so unfortunately go hand in hand. The work will be found of special interest to all students of surgery.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.*]

Deep-sea Researches

WHEN Prof. Wyville Thomson published his recent volume giving the results of the deep-sea researches conducted by himself and his colleagues, Dr. Carpenter, Mr. Jeffreys, and others, he also gave a sketch of the history of the subject; but he made no mention of my memoir on the Microscopic Organisms of the Levant Mud, published in 1847 in the Transactions of the Literary and Philosophical Society of Manchester, though this memoir had been referred to from time to time by Dr. Carpenter, Messrs. Parker and Rupert Jones, and others, and was, next to Ehrenberg's discovery of the microscopic structure of chalk, the starting-point of all these deep-sea investigations. It was the first to call attention to the existence of foraminiferous deposits in the sea, and to insist upon the organic origin of *all* limestones except a few freshwater Travertins, in opposition to the theory of chemical deposits that had previously been advocated in the works of Phillips and other geologists. I do not care very much about these questions of priority of observation, but since Dr. Wyville Thomson's article in NATURE, vol. xi. p. 116, dwells largely upon another point, which was also brought prominently forward in my memoir, I think it worth while preventing a repetition of the oversight, because the two subjects referred to, viz. the foraminiferous origin of calcareous deposits, and the subsequent modification of such deposits by the agency of carbonic acid gas, now prove, as I long ago insisted that they would do, two of the most important factors in the solution of the problem of the nature and origin of deep-sea deposits. Dr. Wyville Thomson, in the article in question, points out that extensive areas of the deep-sea bottom are now occupied by a reddish earth, and he has arrived at the conclusion that this earth is a residue left after all the calcareous Globigerinæ and other such elements have been removed by the solvent action of carbonic acid accumulated in these deep waters. In my memoir I arrived at the same conclusion from the study of the marine Tertiary deposits, containing Diatomaceæ, of Bermuda, Virginia, and elsewhere. I may perhaps be permitted to republish the following extracts from that memoir, since it is not now readily accessible to all the numerous naturalists who are interested in this question:—

"In the recent deposit of the Levant we have generally an admixture of calcareous and siliceous organisms. In some localities the latter are more sparingly distributed than in others; in a few instances they are almost entirely absent. The same admixture occurs in the recent sands from the West Indies. The soft calcareous mud from the bottom of the lagoons of the Coral Islands contains a considerable number of similar siliceous forms, and corresponding results have been obtained in most of the marine sediments from various parts of the globe, examined by M. Ehrenberg.

"On the other hand, the infusorial deposits of Bermuda and Virginia are altogether siliceous. Not one calcareous organism exists. The siliceous forms comprehend the majority of those which I have described from the Levant, many of them being not only *similar* but specifically identical, and the manner in which they are grouped together in these distant localities indicates something more than mere accident. Indeed, we want nothing but the calcareous structures to render these Myocene strata perfectly analogous to those now in process of formation both in the Mediterranean and in the West Indian seas. Are these siliceous deposits, so void of any calcareous organisms, still in the condition in which they were originally accumulated? or were they once of a mixed character, like those of the Levant, having been subsequently submitted to some chemical action which has removed all the calcareous forms, leaving only the siliceous structures to constitute the permanent stratum? I am disposed to adopt the latter opinion, for several reasons."

After showing the resemblance between the residue left after treating certain substances with nitric acid, and the diatomaceous deposits, I proceed to say:—

"Such deposits, in these present conditions, stand out as anomalies in the existing order of oceanic phenomena, and have nothing resembling them except the local freshwater accumulations which occur in various places. Between these, however, no real analogy exists. It must not be forgotten that the Virginian deposit can be traced for above two hundred miles; and, being marine, would doubtless be mixed up with such marine products as were likely to occur along so extended a line. The only recorded instance with which I am acquainted, that exhibits the slightest resemblance, is furnished by M. Ehrenberg, in his examination of materials brought home from the south pole by Dr. Hooker. Some pancake ice, obtained in lat. 78° 10′, long. 162° W., when melted, furnished seventy-nine species of organisms, of which only four were calcareous Polythalamia, the remainder being all siliceous. But even this example, remarkable as it is, does not supply us with any real parallelism. The deposits in question have never yet exhibited a single example of a calcareous organism."

After referring to the European greensands, I continue:—

"Nature furnishes us with an agent quite equal to the production of such effects as we are at present acquainted with. This is carbonic acid gas in solution in water. Mr. Lyell has already availed himself of the instrument to account for the subtraction of calcareous matter from imbedded shells, as well as for some of the changes that have taken place in the structure and composition of stratified rocks . . . It is easy to conceive that whilst these strata were in a less consolidated state than at present, they might be charged with water containing carbonic acid gas. This would act as a solvent of the organic atom of lime until the acid was neutralised." . . .

After venturing upon these conclusions in 1847, not as mere speculative guesses, but as the deliberate result of a long series of investigations carefully worked out, I need scarcely say how intense was the interest with which I read Dr. Wyville Thomson's observations, which so thoroughly sustain and confirm the accuracy of mine. My conclusions were wholly derived from the microscopic observations of earths and rock specimens which I compared with the few examples of foraminiferous ooze with which I was then familiar. The *Challenger* researches now show us how extensively the conditions described in my memoir have prevailed; a fact which could not have been ascertained before the machinery for deep-sea exploration attained to its present perfection. But having arrived at them in a decided or definite manner when the materials for doing so were much more scanty than they now are, and when no one except myself and the late Prof. Bailey of West Point were giving much attention to the subject, I think I am justified in wishing the fact to be placed on record.

Owens College, Dec. 12 W. C. WILLIAMSON

Origin of Bright Colouring in Animals

THE origin of the bright colouring of flowers, through natural selection effected by insects, appears to me one of the strongest points of the Darwinian theory. But I think the origin of the bright colouring of many animals, especially birds and insects, is on the contrary one of the greatest of its difficulties. Darwin accounts for it in most cases by sexual selection—the most beautiful males being the best able to obtain mates and to leave offspring.

In the way of this theory there are three very serious difficulties, which I think have not been dwelt on as they deserve.

1. Before special coloration could arise as a specific character, the colours must have been variable; for selection can work only when it has variation to work with, and it appears incredible that such a cause as sexual selection could ever give them any great degree of fixity. But the bars and spots on the wings of birds and butterflies are, as a rule, perfectly definite, and not more variable within the limits of the same species than any other part of the organism. This difficulty does not apply in the same degree to the origin of the coloration of flowers through